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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/511,402	05/03/2005	Walter Spiess	2002DE305	9206

26289 7590 04/26/2007  
AZ ELECTRONIC MATERIALS USA CORP.  
ATTENTION: INDUSTRIAL PROPERTY DEPT.  
70 MEISTER AVENUE  
SOMERVILLE, NJ 08876

EXAMINER
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DAHIMENE, MAHMOUD

ART UNIT	PAPER NUMBER
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1765

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/26/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/511,402

Applicant(s)

SPIESS ET AL.

Examiner

Mahmoud Dahimene

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al. (US 4,557,797) in view of Fedynyshyn (US 2003/0099897) and Haoying Li et al. (Journal of Nanoparticle Research 3: 157-160, 2001).

Fuller discloses multi-level resists on top of substrates are conventionally used in photolithography (column 1, line 4). Fuller also teaches that Novolak-based photoresists are conventionally used in bi-layer resist process photolithography (column 2, line 52), and UV light sensitive high etch resistance is desirable.

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It is noted that Fuller is silent about polymerizable silane and nanoscale particles.

Fedynyshyn teaches nanoparticles encapsulated inorganic materials increase the plasma etch selectivity of the resists compared to conventional polymeric resists (abstract and claim 16), the nanoparticles include silicate, aluminates and titanates (paragraph 0020).

Li teaches "The inorganic-organic nanocomposite coatings are prepared on poly(methyl methacrylate) (PMMA) substrate by the spinning technique which involves incorporating homogeneously nanosized ZnO particle into the molecular inorganic-organic hybrid matrices. The hybrid matrices are derived from tetraethoxyasilane (TEOS) and 3-glycidoxypropyltrimethoxy silane (GLYMO). To avoid the destruction of the polymer structure caused by ZnO and modify the interface between nanoparticles and organic groups, ZnO was first surface-coated with SiO<sub>2</sub> from hydrolyzed TEOS using ammonia water as catalyst. The coatings thus obtained are dense, flexible, abrasion resistant and UV absorbent" (abstract). In general, silicon, aluminum, titanium or zirconium alkoxides have been used to form the inorganic network (page 157).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the multi-level resist of Fuller to include the coating of Li with silicate, aluminates and titanates because Fedynyshyn teaches such coatings are desirable for plasma etch selectivity. It would have been obvious to one of ordinary skill in the art at the time the invention was made use silicate, aluminates and titanates because such materials are more conventionally known to be more compatible with semiconductor fabrication. One of ordinary skill in the art would have been

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motivated to use the coating of Li in order to obtain a sol-gel applicable resist layer which is dense abrasion resistant (plasma resistant) mask for plasma etching small features.

***Claim Rejections - 35 USC § 103***

4. Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (US 6,954,275) in view of Fuller et al. (US 4,557,797), Fedynyshyn (US 2003/0099897) and Haoying Li et al. (Journal of Nanoparticle Research 3: 157-160, 2001).

Choi describes a method for the production for microlithographic arrangement (figures 1A-1B) including the steps: i) production of a planar uncured sol film (16); ii) production of a target substrate comprising a bottom coat (18) and a support (20); iii) transfer of sol film material by means of a microstructured transfer imprint stamp to the bottom coat (18); iv) curing of the transferred sol film material; v) removal of the transfer imprint stamp to give an imprinted microstructure as top coat.

It is noted Choi is silent about a nanocomposite sol film.

A nanocomposit sol arrangement has been discussed above.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Choi to include the modified arrangement of Fuller because Fedynyshyn teaches nanoparticles encapsulated materials increase the plasma etch selectivity of the resists. One of ordinary skill in the

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art would have been motivated to use a nanocomposit sol in order to increase the mask etch resistance.

***Claim Rejections - 35 USC § 103***

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (US 6,954,276) in view of Fuller et al. (US 4,557,797), Fedynyshyn (US 2003/0099897) and Haoying Li et al. (Journal of Nanoparticle Reasearch 3: 157-160, 2001) and further in view of Kropewnicki et al. (US 6,440,864).

It is noted that choi is silent about removing or cleaning residuals or etching a bottom coat with oxygen.

Kropewnicki discloses "During cleaning, the substrate 30 is placed on the support 105 in the process zone 110 and exposed to energized process gas comprising cleaning gas. Heat transfer fluid may be circulated to maintain the substrate 30 at a desired temperature. Process gas comprising cleaning gas is introduced by gas supply system 165 and energized in the process zone 110 to remove etchant byproducts 60 and remnant resist 50 on the substrate 30. In one version, the cleaning gas may comprise (i) one or more oxygen-containing gases, such as one or more of O.sub.2, H.sub.2 O, O.sub.3 and He--O.sub.2, and optionally (ii) an additive gas, such as one or more of N.sub.2, NH.sub.3, CF.sub.4, C.sub.2 F.sub.6, CHF.sub.3, C.sub.3 H.sub.2 F.sub.6, C.sub.2 H.sub.4 F.sub.2, or CH.sub.3 F. The cleaning gas may serve to both strip (or ash) remnant resist 50 and to remove etchant residue 60 from the substrate 30. A single cleaning step may be performed or multiple cleaning steps may be performed"

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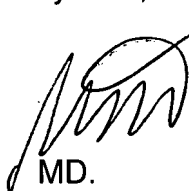
(column 6, line 48). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify the process of Choi to remove undesired masking residues using a plasma comprising any process gas that is effective to remove the undesired residues including O.sub.2 and CHF.sub.3 mixture, or use O.sub.2 when the residues or etching a polymeric material is involved because cleaning/etching with such gases is conventionally used in the art of semiconductor fabrication technology. One of ordinary skill in the art would have been motivated to to clean residues in order to obtain a clear pattern and etch or open mask bottom coating in order to allow the mask pattern to be transfer to the substrate for etching or doping applications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahmoud Dahimene whose telephone number is (571) 272-2410. The examiner can normally be reached on week days from 8:00 AM. to 5:00 PM..


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



MD.



**SHAMIM AHMED**  
**PRIMARY EXAMINER**